

R&I: Nuts & Bolts



DO YOU BELIEVE YOUR PARENTS INFLUENCED YOU IN BECOMING A DOCTOR?

Both my parents were doctors. My father Dr Roy Schembri Wismayer used to work as pathologist and my mother is Dr Mercedes Zarb Adami. Although both parents never directly influenced us on the matter, indirectly this may have influenced me, and my sister Marika, to choose medicine. Our other three siblings chose different pathways. Although my first inclination was to become a zookeeper and then veterinary surgeon, this metamorphosized to a liking for human medicine at around 14 years of age. Maybe this stemmed from the fact that I used to see my father carry out flame photometry, and microbiology tests on agar plates in the laboratory just off our garden [duly inspected and certified by local health authorities]. This was the seventies when Malta experienced the medical strike following a disagreement between the government and the Medical Association of Malta.

IN JUNE 2019 THE EUROPEAN COMMISSION PUBLISHED THE 'PEER REVIEW - MALTESE RESEARCH AND INNOVATION SYSTEM' WHICH STATED THAT 0.55% OF MALTA'S GDP IS SPENT ON R&D, WHICH IS "ON A DOWNWARD TREND"; THIS IS "AT ODDS WITH ITS STATED OBJECTIVE OF REACHING 2% OF GDP ... BY 2020." THIS MAY HOWEVER BE ATTRIBUTED TO THE FACT THAT GDP IN 2014 WAS < €8 BILLION AND IN 2019 IT WAS > €13 BILLION. WHAT ARE YOUR THOUGHTS ON THIS?

Malta lacks basic scientific literacy. The general population seems to lack even a basic understanding of e.g. what is a virus, related transmission mechanisms, stem cells, etc. The reaction of the Maltese people to the COVID-19 pandemic is an example. This certainly stems from the low investment in this area, even if one factors in the increase in GDP along the years. Our education system may be part of the problem. Since childhood we are taught to always obey our teachers and not challenge what we are taught. The result of this is amply seen at University level. Let us consider medical students as example. From experience I can say that they shine for memory recall but then they generally stall on questions relating to thinking. This is seen less in foreign medical students. I strongly believe that our students should be taught differently from childhood, with more discussion groups and more lab work in lieu of lectures. This is what we advocate in the workshops which we organize as part of Science in the City and Teen Science Café initiatives. I strongly believe that instilling a sense of creativity at a young age stimulates a culture of research.

Truth be told, in recent years Malta did invest heavily in IT in relation to research; also, MCST funding has increased considerably. Recently the UoM also started offering four

annual research grants of €60,000 each. Biomedical and Life Sciences research is eligible for one such grant and participants compete through an open-call. However, funding for R&D locally is still low when compared to other countries. Politicians talk about a knowledge economy but this, in reality, is still lacking. In keeping with this, when PhD students graduate, another challenge arises. Few or no jobs are available locally. It is thus important for policy makers to forecast supply and demand and invest accordingly. It seems that when the generics companies came to Malta there wasn't enough talent locally. On the other hand, today we are seeing more PhD students graduate, however the Life Sciences Park only seems to attract small companies with limit demand for postdocs. This could well lead to a brain drain. Further to this another challenge relates to the postdoc posts at the UoM in that it only offers *temporary* contracts which preclude researchers from getting any bank loans. What I suggest is that University starts to offer a pool of postdocs on a *permanent* basis with a decent pay; however, the salary should be less than that offered by industry so that they eventually leave and free up the postdoc posts for other researchers.

YOU ARE INVOLVED THE RESEARCH PROJECT MALTAHIP WHICH HAS DEVELOPED A NOVEL HIP JOINT. THIS IS CLOSE TO BEING PATENTED. WHAT MAKES YOUR INVENTION STAND OUT?

Have you ever questioned why arthritis in the leg affects the hip and knee but not the ankle, even though the ankle supports greater weight? The reason lies in the anatomy. The hip and knee are curved from 2 axes with pressure mainly exerted on one point. On the other hand the ankle is curved on 1 axis only with pressure distributed on an entire line. This motivated us to use the anatomy of the ankle to develop the MaltaHip. This makes our hip different from other hip prostheses that are anatomically much more similar to each other, except for their composition. Our results to date are promising. MaltaHip seems to provide superior wear resistance of approx. 300%. This could well be a game changer.

Apart from myself, Prof. Ing. Joseph Buhagiar, Prof. Ing. Pierluigi Mollicone and Ing. Donald Dalli from the Faculty of Engineering, UoM are involved in this research. In our case Malta's small size is actually advantageous. The engineering department is only 150 metres from the Biomedical Sciences

Building so collaborating is easy. We first used computer modelling and then Empav Engineering Ltd, a local company, machined the first prototypes. MaltaHip has also been tested on a cadaver by local orthopaedic surgeons, Mr Ray Gatt and Mr Ryan Giordamaina. The surgeons concluded that the stability and movement were exceptional, which means that the implant may also appeal to the Eastern market who are accustomed to squatting instead of sitting down. Further testing has taken place at an accredited laboratory in Germany. The project could only have been possible with the €200,000 grant from MCST through the R&I Fusion Programme.

After the preclinical phase is concluded, and once the patent is in hand, we need to publish extensively on the matter. Afterwards comes the clinical testing. We are currently developing the business plan together with an Anglo-American company. We could approach a market leader who may or may not wish to collaborate with us because MaltaHip may translate in less overall hip sales; otherwise from a strategic point of view we could collaborate with insurance companies. Healthcare systems in countries like the US, Germany and Switzerland rely heavily on health insurances. Yet another option is to go to 2nd tier companies who may use MaltaHip to put a foot in the door of the hip replacement market.

ONE OF YOUR BRAINCHILD'S INVOLVES THE USE OF HISTIOCYTES FOUND IN THE CHRYSALIS OF THE WHITE BUTTERFLY CABBAGE FOR LEUKEMIA. PRE-CLINICAL TESTING HAS BEEN PROMISING. CAN YOU EXPLAIN MORE?

In the chrysalis, the caterpillar lyses completely leaving only a few *histiocytes* which are like stem cells. These produce the entire butterfly, causing differentiation of gut, nervous system, muscle etc. So my hypothesis was that the histiocytes can be used for the treatment of acute myeloid leukemia. This research has been carried out by Dr Analisse Cassar for her undergraduate thesis, masters, PhD and she is furthering this during her postdoc. We initially tested the hypothesis of differentiation therapy on 3 cell lines of acute myeloid leukemia. However, our research branched out to chronic myeloid leukemia. This seems to be working well enough so we started carrying out research on the cells extracted from the salamander leg, sea cucumber and planaria. We are also extending this research to osteosarcoma and brain tumours.

IN A SIMILAR INTERVIEW I ASKED SURGEON DR JOSEPH DEBONO ABOUT HIS THOUGHTS ON THE BARTS MEDICAL SCHOOL WHICH OPENED LAST OCTOBER IN GOZO. HE SAID THAT HE SUPPORTS HEALTHY COMPETITION, HOWEVER, ONE MEDICAL SCHOOL SHOULD NOT HAVE AN IMPROVED SERVICE AT THE EXPENSE OF THE OTHER. DO YOU SHARE HIS FEELINGS?

I agree that competition is healthy but Malta has a resource problem. One must remember that Malta has always limited the number of students who enrol in

medicine for a simple reason ... our hospitals have a limited number of patients which need to be shared by all students as part of their clinical training. The fact that currently 150 students are enrolling each year in the UoM's medicine course means that there are approx. 450 clinical year students. On the other hand, Barts is aiming to have 60 students each year with each year doing clinical practice. This would hypothetically mean that training for the UoM's 450 clinical year students could be reduced because patients in our hospitals would need to be shared between 750 students.

I RECENTLY INTERVIEWED PROF. SANDRO GALEA - DEAN AT THE BOSTON UNIVERSITY SCHOOL OF PUBLIC HEALTH, US - WHO MADE REFERENCE TO THE 'HEALTHIEST GOLDFISH'. HE CLAIMED THAT WE SHOULD INVEST IN CREATING A WORLD WHERE WE CAN 'DIE HEALTHY' RATHER THAN SPEND MONEY IN A FUTILE EFFORT TO LIVE FOREVER WHILE IGNORING THE CORE DRIVERS OF HEALTH. HOW MUCH DO YOU THINK THE ENVIRONMENT AFFECTS THE INCIDENCE OF CANCER LOCALLY?

In my research group, we classify cancer in two groups, those which affect solely adults such as lung, pancreas and stomach, and those which affect both adults and children such as gliomas, sarcomas and leukemias. There is a clear biological difference. Those which affect solely adults are generally located on the exterior such as skin, lung and colon whilst the others are found on the inside such as bone marrow and brain. Our hypothesis is that we develop cancer as adults [on the outside of our body] through *continuous* exposure, rather than occasional exposure. On the other hand, the risk from the overall environment is greater for children. Benzene emissions from cars and pesticides have been shown to lead to paediatric cancers [on the inside] even with limited exposure.

WOULD YOU HAVE IMAGINED THIS LIFE 20 YEARS AGO?

I always wanted this life of research and lecturing. However, it is painstakingly long to build a research team that is needed to finally achieve some results. My wish is to develop a medical company with a focus on innovation. On a side note, I would also have liked to be slimmer and more healthy. Weight management is something which is on my mind ... we can possibly discuss this in a future interview ...

YOU READ THESYNAPSE BECAUSE ... both as a general doctor (I still function as a GP of sorts with family and friends) and as a lecturer, it is important to keep oneself up-to-date. Teaching pre-clinical sciences like anatomy and cell biology is most useful when they are informed by clinical scenarios. Just like international journals like 'Evidence-based Medicine', local journals like The Synapse help in this endeavor.